

Logging of 10 hectares in the heart of the Sierra Chincua monarch butterfly overwintering area

(date completed 12 Dec 2015 10pm)

by

Lincoln P. Brower¹, Daniel A. Slayback², Pablo Jaramillo-López³, Isabel Ramirez⁴, Karen S. Oberhauser⁵ and Linda S. Fink¹

1. Department of Biology, Sweet Briar College, Sweet Briar, VA 24595, brower@sbc.edu, lfink@sbc.edu
2. Science Systems and Applications, Inc., Biospheric Sciences Lab, NASA Goddard Space Flight Center, Greenbelt, MD 20771, dan.slayback@nasa.gov
3. Instituto de Investigaciones en Ecosistemas y Sustentabilidad, Universidad Nacional Autónoma de México, Antigua Carretera a Pátzcuaro No. 8701, CP. 58190, Morelia, Michoacán, México, pjaramillo@cieco.unam.mx
4. Centro de Investigaciones en Geografía Ambiental, UNAM Campus Morelia, Antigua Carretera a Pátzcuaro, 8701, CP. 58190, Morelia, Michoacán, México, isabelrr@ciga.unam.mx
5. Department of Fisheries, Wildlife and Conservation Biology, 1980 Folwell Ave., University of Minnesota, St. Paul MN 55108, oberh001@umn.edu

We provide information on the location and extent of illegal logging in the Monarch Butterfly Biosphere Reserve in Mexico that has taken place in 2015. This logging adds significant threats to the already precarious future of the overwintering phenomenon of the monarch butterfly in Mexico.

On 9 October 2015 on the Michoacán evening news, Rafael Pacchiano, Secretary/Minister in charge of SEMARNAT, and Guillermo Haro, Director of PROFEPA, announced that the Mexican army and police had confiscated 147 cubic meters of wood that had been illegally logged from an unspecified area in the Monarch Butterfly Biosphere Reserve (MBBR). On 18 November 2015, Brower received notice of a serious logging operation in the Sierra Chincua near the Ejido of Jesús de Nazareno in the northwestern part of the Reserve. Shortly thereafter, the Mexico News Daily (Mexico City, Saturday 21 November 2015) stated that local landowners reported that 9 hectares had been clear-cut.

To determine the location and extent of the logging, we obtained a satellite image of the Sierra Chincua taken on 29 November 2015. Figures 1 and 2 show the western portion of the Sierra Chincua, which show the two historical major overwintering locations: Arroyo Hondo, with its main drainage shown in blue, and Arroyo Zapatero. These two areas have hosted substantial colonies of overwintering monarch butterflies for the past 40 years (Calvert and Brower, 1986; Brower, 1995; Missrie, 2004; Rendon et al., 2014).

The images indicate that approximately 10 hectares have been clear-cut in the heart of the Arroyo Hondo overwintering area. In February 2007 we observed a colony at this location, as

shown in Figure 3 (aerial photograph). The northern section of the current clear cut extends into the area that had been occupied by the 2007 colony.

Arroyo Hondo is one of the most important wintering areas for the butterflies. Much of what we know about overwintering monarch butterflies' behavior, physiology and ecology comes from research that multiple scientists have conducted in this area over more than three decades (references available upon request). The site is also an area of extraordinary beauty and was, for example, the location of a BBC documentary on the butterflies filmed in 2006 and broadcast in 2010. Along with the Rosario and Herrada colonies, Sierra Chincua is one of the most important areas routinely visited by tourists.

The newly logged area is outlined in red on the images. Figure 4 shows an enlarged view of the area in 2013 before it was clear-cut (4a) and in November 2015 after it was clear-cut (4b). The numbered red circles indicate where additional predatory logging (the removal of individual logs, Figure 5) had also occurred when the area was visited by one of us on 2 June 2015. To further pinpoint when the logging took place, we also examined three Landsat images taken on 15 April 2015, 13 August 2015 and 22 September 2015. These images indicated that the bulk of the clear-cutting occurred between April 2015 and August 2015.

Figure 1 also shows that the logging operation is located on land owned by the State of Michoacán. This 65 ha parcel had not shown evidence of clear-cutting since at least 1971, and represented one of the few areas of mature forests in the reserve. It is bordered by federal property to the north, and by the ejidos of Jesús de Nazareno (to the west), Cerro Prieto (to the east), and Hervidero y Plancha (to the south). None of these ejidos nor the federal property show evidence of clear-cutting.

Conclusion: The imagery presented in this document indicates that protection of the Monarch Butterfly Biosphere Reserve, designated as a World Heritage Site on 8 July 2008, is inadequate. It is especially concerning that the clear-cutting operation was on government-owned land and not in the immediately adjacent ejidos. The Sierra Chincua, Cerro Pelón and Rosario colony areas have been the three most important overwintering massifs for monarchs, at least since their discovery in 1975. The entire west face of Cerro Pelón where the monarch colonies were first reported by Dr. Fred Urquhart has been degraded by logging that was still occurring as of 14 January 2015 and was reported again in November 2015.

If the migratory and overwintering phenomenon of the monarch butterfly is to persist, forest protection must be enforced year round in the entire Reserve. We hope that the U.S. and Canada can join with the people and government of Mexico to provide whatever support is needed to ensure that this level of enforcement takes place, and that ongoing actions to protect and restore breeding and migratory habitat in the U.S. and Canada ensure that increasing numbers of monarchs return to the Reserve every winter. We understand that the social and economic pressures in the MBBR are complex, and offer our support to the current leadership of the MBBR and other individuals and organizations working in this area.

Figure captions

Figures 1 (2-dimensional view) and 2 (3-dimensional view). An annotated WorldView-2 (DigitalGlobe) satellite image taken on 29 Nov 2015. The red polygon indicates the boundary of the 10 hectare logged area. The orange triangles indicate the approximate centers of a number of historical colony locations dating back to 1977, ranging up to 6 hectares in size. The larger triangle near the top of the logged area marks the center of the 2007 colony shown in Figure 4.

The pink lines demarcate land parcels within the Core Zone of the Reserve including properties owned by local communities, the State of Michoacán, and the Federal government. The white line is the 3000 m elevation contour, and the green line demarcates the Core Zone of the Reserve. The upper white pin ("MA") shows the location of the Mojonera Alta boundary marker on the northern border of the State Property. This is where tourists assemble to view the Arroyo Hondo butterfly colony. The lower white pin ("OL") is the location of a spectacular overlook at the head of Arroyo Zapatero. The numbered red circles indicate where additional predatory logging (the removal of individual logs, Figure 5) had also occurred when the area was visited by one of us on 2 June 2015.

Figure 3. Photograph of a 1.4 hectare colony occupying part of the now-cleared forest. Photograph was taken from a small aircraft on 11 February 2007. The center of this colony is marked on Figure 1 by the large orange triangle with white outline. The overlook marked "OL" is the same as the OL on Figure 1. The rocky knoll on the right side of this photograph is clearly visible in the top-center of figure 4a, just east of the upper portion of the red polygon. Aircraft and pilot were provided by LightHawk.

Figure 4. The area (a) before it was logged, in a Pleiades-1 (CNES Airbus Defense and Space) satellite image taken on 30 Nov 2013; and (b) after it was logged, in the WorldView-2 (DigitalGlobe) image taken on 29 Nov 2015.

Figure 5. Examples of two trees cut by predatory logging as indicated in Figure 1. (A= No. 28; B = No. 32). Photos by P. Jaramillo, 2 June 2015.

References

- Brower, L. P. 1995. Understanding and misunderstanding the migration of the monarch butterfly (Nymphalidae) in North America: 1857-1995. *Journal of the Lepidopterists' Society* **49**:304-385.
- Calvert, W. H., and L. P. Brower. 1986. The location of monarch butterfly (*Danaus plexippus* L.) overwintering colonies in Mexico in relation to topography and climate. *Journal of the Lepidopterists' Society* **40**:164-187.
- Missrie, M. 2004. Design and implementation of a new protected area for overwintering monarch butterflies in Mexico. Pages 141-150 in K. S. Oberhauser and M. J. Solensky, editors. *The Monarch Butterfly Biology and Conservation*. Cornell University Press, Ithaca.
- Rendon-Salinas, E., A. Fajardo-Arroyo, and G. Tavera-Alonso. 2014. Superficie forestal ocupada por las colonias de hibernación de la mariposa monarca en Diciembre de 2014. pp. 1-4, CONANP, Mariposa Monarca Reserva de la Biosfera, WWF, Telcel, Mexico City, Mexico.

Figure 1

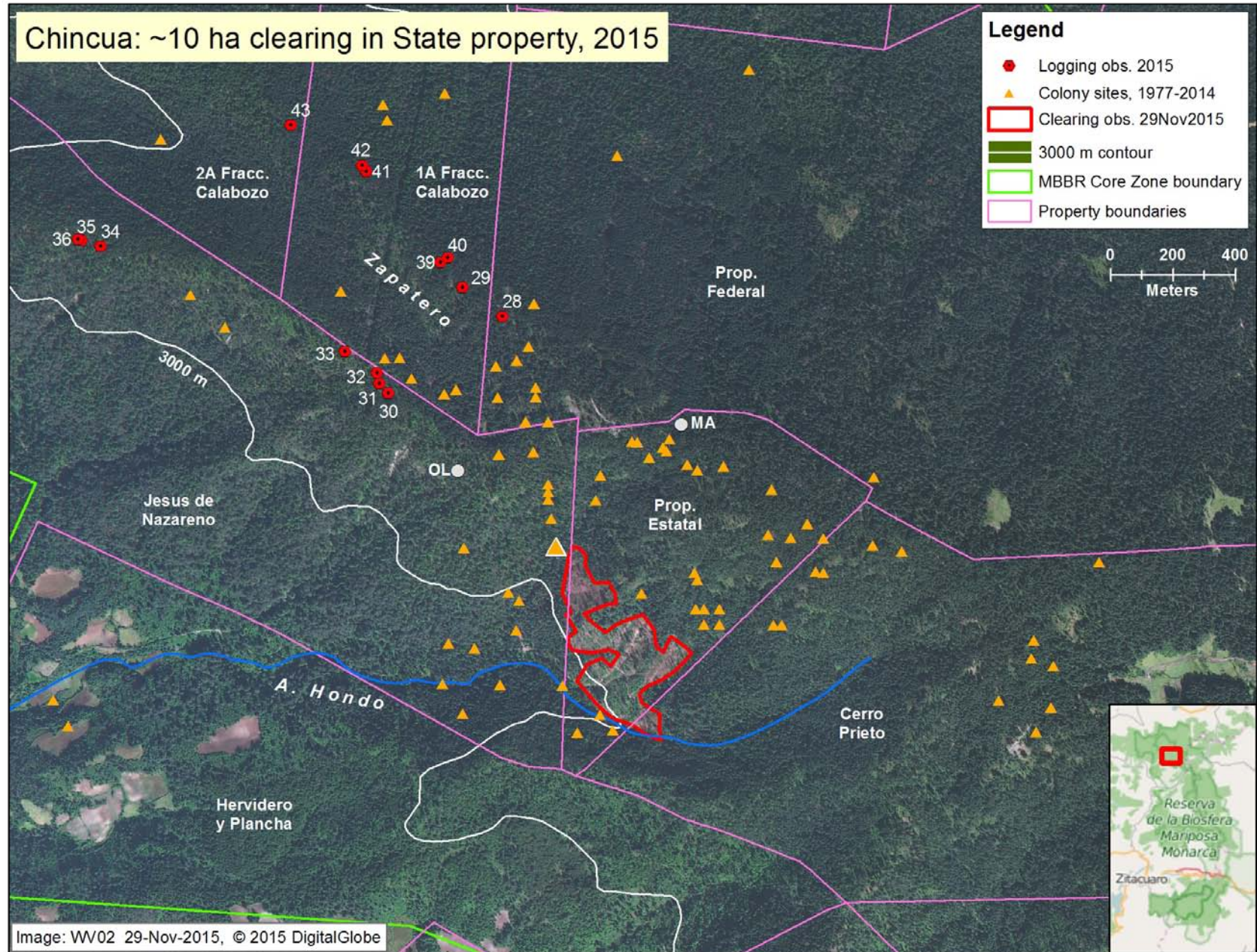


Figure 2

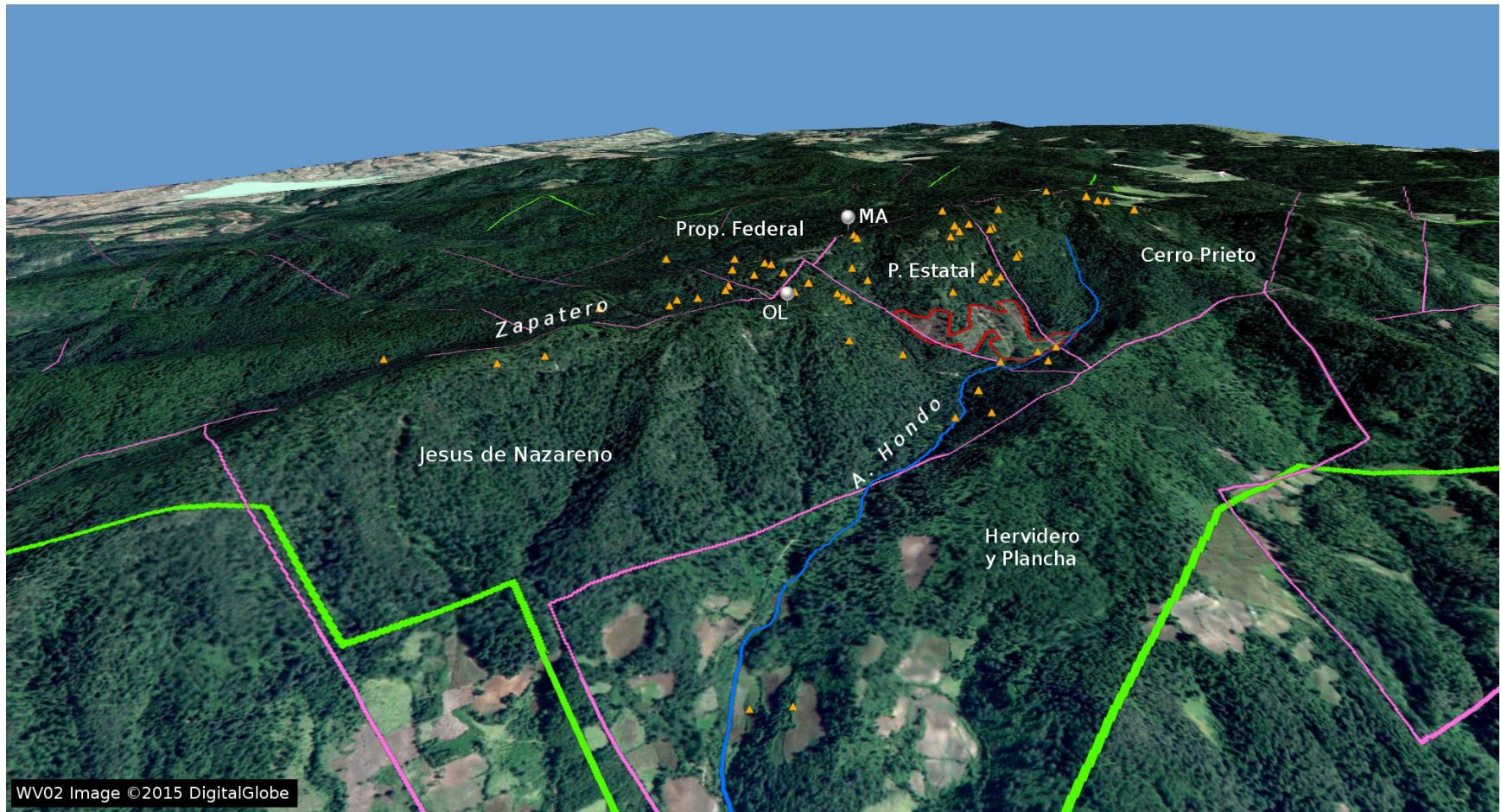


Figure 3



Figure 4a (left) and 4b (right)

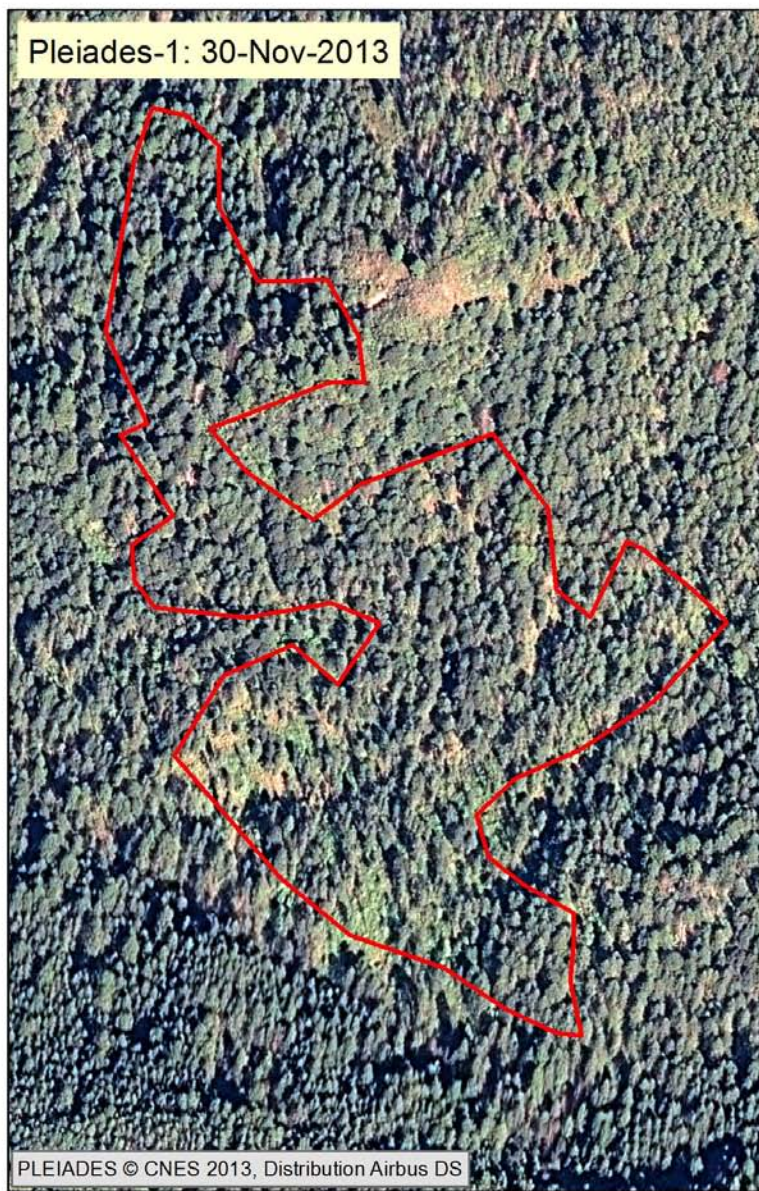


Figure 5a (above) and 5b (below)

